Advanced Data Mining and Deployment for Integrated Vehicle Health Management and the Space Vehicle Lifecycle, Phase II

Completed Technology Project (2008 - 2011)

Project Introduction

In a successful Phase 1 project for NASA SBIR topic A1.05, "Data Mining for Integrated Vehicle Health Management," Michigan Aerospace Corporation (MAC) demonstrated its SPADE anomaly detection software to key personnel in NASA's Intelligent Systems Division (ISD) and with data from our partners at Boeing, SpaceX and GMV Space Systems. The feedback from these demonstrations was used to establish future development directions for Phase 2. Phase 2 will consist of three major efforts: 1) the design and implementation of the Taiga system, a next-generation enhancement of the SPADE software, 2) an investigation into combining complementary functionality of Taiga with existing code at ISD including the Inductive Modeling System, Mariana and others, and 3) the implementation of a prototype automatic parallelizer, in cooperation with subcontractor Optillel Solutions, for a subset of C++ useful for hardware acceleration of machine learning applications. The scope of the interaction with researchers in NASA ISD will be to explore the relationships between IMS and Taiga and gauge benefits such a Data Handling, Feature Reduction, Visualization and Explainability. We will also investigate heterogeneous ensemble methods by analyzing the Mariana system. Optillel's C++ Parallelizer will reduce MAC's development costs for parallelizing C++ code for multi-core chips and clusters. This effort will build on Optillel's existing body of work that supports graphical programming languages, and will extend their technology to the analysis and parallelization of C++ code. Both the Taiga system and Optillel's prototype have significant commercialization potential in industries as diverse as Chemical, Pharmaceutical, Manufacturing and Aerospace.

Primary U.S. Work Locations and Key Partners
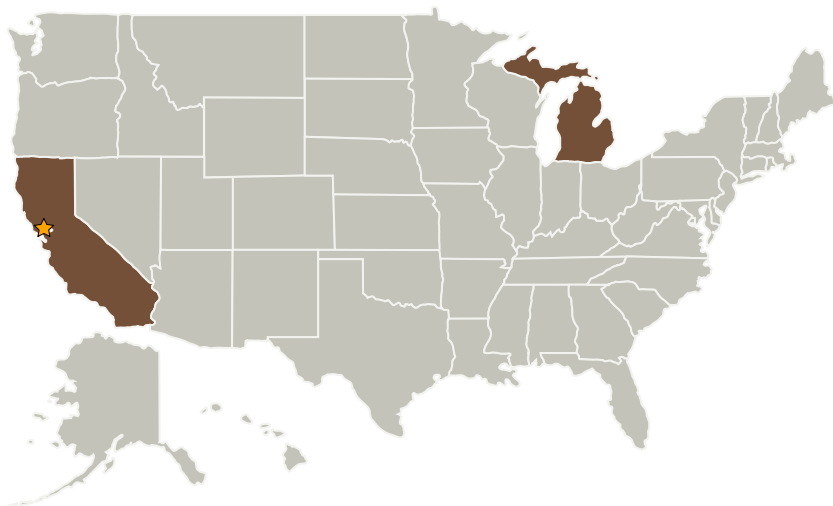
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For more information and an accessible alternative, please visit:
https://techport.nasa.gov/view/7847

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
⭐Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Michigan Aerospace Corporation	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
California	Michigan

Project Transitions

▶ **December 2008:** Project Start

✔ **January 2011:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  └ TX11.4 Information Processing
    └ TX11.4.2 Intelligent Data Understanding